STRENGTHENING FEDERAL SUPPORT FOR CLIMATE MIGRATION THROUGH COASTAL RESILIENCE GRANTS

by
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A capstone project submitted to Johns Hopkins University in conformity with the requirements for the degree of Master of Arts in Public Management

Baltimore, Maryland
December 2020

Abstract

Climate change impacts such as sea level rise (SLR) and coastal erosion are expected to make relocation an inevitability in certain coastal areas of the United States. Although climate migration is anticipated to become a widespread phenomenon, it remains a nascent policy area and the government has provided limited support to community-led relocation efforts thus far. Existing federal programs that may enhance climate change preparedness are not designed to facilitate migration. Drawing on lessons from previous relocation projects and research regarding the benefits of national investment in climate resilience, this paper recommends that Congress establish a new grant program under the Coastal Zone Management Act to increase federal assistance for climate migration activities.

Capstone Advisor: Paul Weinstein Jr.

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Acknowledgments

To my parents, mentors, and friends.

Thank you for your tireless support. I remain an optimist and an eager student because of you.

TO: Sheldon Whitehouse [D-RI], Ranking Member of the Subcommittee on Clean Air and Nuclear Safety, Committee on Environment and Public Works, United States Senate

FROM: Eda Lee

DATE: October 7, 2020

SUBJECT: Strengthening Federal Support for Climate Migration through Coastal Resilience Grants

Action-Forcing Event

On July 6, 2020, the United States Government Accountability Office (GAO) published a report titled *Climate Change: A Climate Migration Pilot Program Could Enhance the Nation's Resilience and Reduce Federal Fiscal Exposure* following a request from five Senators to examine "the extent of federal support for communities' climate migration efforts."[1] The report details how federal funding has primarily focused on post-disaster recovery while providing limited support to climate migration efforts, and there has been little research done on migration as a resilience strategy.[2]

Statement of the Problem

Experts have calculated that 13.1 million people in the U.S. will be directly impacted by sea level rise (SLR) by the year 2100 under a 1.8 meter SLR scenario.[3] In the shorter term, the Internal

[1] U.S. Government Accountability Office, *Climate Change: A Climate Migration Pilot Program Could Enhance the Nation's Resilience and Reduce Federal Fiscal Exposure*, GAO-20-488 (Washington, DC, 2020), accessed August 19, 2020, http://www.gao.gov/products/GAO-20-488.

[2] This paper uses GAO's definitions of climate resilience and climate migration. Climate resilience encompasses climate adaptation and pre-disaster hazard mitigation, and "enhancing [it] means taking actions to reduce potential future losses by planning and preparing for potential climate hazards, such as extreme rainfall, sea level rise, and drought." Climate migration "is the preemptive movement of people and property away from areas experiencing severe climate change impacts…and encompasses both (1) the relocation and resettling of an entire community to a different site and (2) managed retreat, or the gradual, controlled movement of a portion of a community's infrastructure, facilities, homes, and businesses out of the most hazardous areas." Climate migration is a new field of research, and formal terminology has not yet been established. GAO-20-488, p.1-2.

[3] Caleb Robinson, Dilkina, B., and Moreno-Cruz, J., "Modeling migration patterns in the USA under sea level rise,' PLoS ONE 15(1): e0227436 (2020), https://doi.org/10.1371/journal.pone.0227436; Mathew Hauer, Evans, J. and

Displacement Monitoring Centre's (iDMC) global risk model has projected that an annual average of 100,729 people are at risk of being internally displaced by flooding and storm surge, while recognizing that this figure is an underestimation.[4] Although methodologies for predicting climate migration vary among experts and organizations, it is clear the phenomenon will critically affect certain coastal populations. As depicted in figure 1, the impacts of SLR are highly regionalized. The southeastern region of the U.S. is expected to face disproportionately high impacts and represents "nearly 70% of the entire projected populations at risk."[5] Almost half of Americans exposed to SLR are located in Florida alone.[6]

To date, the federal government has not invested in climate resilience to the extent that it would be equipped to support climate migration activities induced by SLR. The Fourth National Climate Assessment (NCA) released in 2018 stated that moving millions of people and billions of dollars in infrastructure is an undertaking that "creates challenging legal, financial, and equity issues that have not yet been addressed" and there are coastal regions where "retreat will become an unavoidable option" except under the lowest SLR projections.[7] In the coming decades, many communities will need to consider migration, and literature and research suggest there could be population movements on a scale similar to that of the Great Migration from 1910 to 1970.[8]

Mishra, D. "Millions projected to be at risk from sea-level rise in the continental United States," *Nature Climate Change* 6, 691–695 (2016), https://doi.org/10.1038/nclimate2961.

[4] Internal Displacement Monitoring Centre (iDMC), Global Report on Internal Displacement 2019, United States of America – Figure Analysis – Displacement Related to Disasters, https://bit.ly/2JuX539; United States – Country Information, iDMC, https://www.internal-displacement.org/countries/united-states.

[5] Hauer et al. "Millions projected to be at risk from sea-level rise in the continental United States," *Nature Climate Change*, p. 692; Mathew Hauer, Fussell, E., Mueller, V. et al. "Sea-level rise and human migration," *Nature Reviews Earth & Environment* 1, January 2020, p.33, https://doi.org/10.1038/s43017-019-0002-9; Robinson et al., p.11.

[6] Hauer et al., "Sea-level rise and human migration," *Nature Reviews Earth & Environment* 1 (2020), p.34.

[7] U.S. Global Change Research Program (USGCRP), *Impacts, Risks, and Adaptation in the United States*: *Fourth National Climate Assessment, Volume II*, [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)], 2018, p.1329, https://nca2018.globalchange.gov/.

[8] GA0-20-488, p.27-30; Hauer et al., "Millions projected to be at risk from sea-level rise in the continental United States," *Nature Climate Change* 6 (2016), p.691.

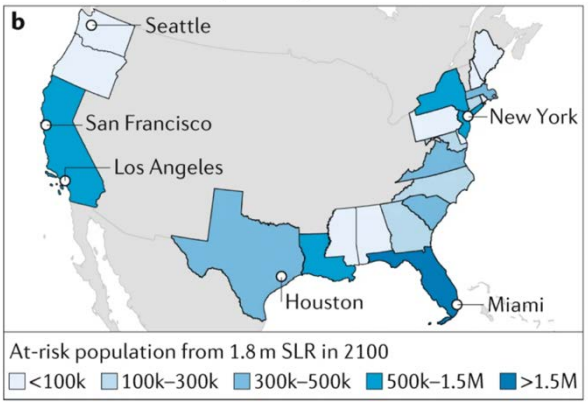

Figure 1. Projected Populations at Risk from SLR in the USA under a SLR Scenario of 1.8m by 2100. (Nature Reviews Earth & Environment, 2020.)

According to data from the National Oceanic and Atmospheric Administration (NOAA), the U.S. experienced 69 separate billion-dollar weather and climate disasters during a five-year period (2015-2019), costing over $525 billion. In 2019, there were 14 separate disasters, amounting to $45 billion in costs. The agency also pointed out an emergent trend that these billion-dollar disaster events are "becoming an increasingly larger percentage of the cumulative damage from the full distribution of weather-related events at all scales and loss levels."[9] These figures do not reflect the total cost of disasters. Since they only account for billion-dollar events, the actual total cost is higher.

The increasing reliance on the government's role as the provider of disaster aid has a direct relationship with the frequency and intensity of extreme weather events that accompany climate change. Federal fiscal exposure due to climate change risks has been on GAO's High-Risk List since 2013.[10] The latest update to the list indicated that the "federal government has not made measurable progress to reduce its fiscal exposure to climate change" and the increasing

[9] Adam B. Smith, "2010-2019: A landmark decade of U.S. billion-dollar weather and climate disasters," National Oceanic and Atmospheric Administration (NOAA), January 8, 2020, https://www.climate.gov/news-features/blogs/beyond-data/2010-2019-landmark-decade-us-billion-dollar-weather-and-climate.
[10] GAO, *High-Risk Series,* GAO-19-157SP, (Washington, DC, 2019), p.110, https://www.gao.gov/assets/700/697245.pdf.

dependence on post-disaster aid is a "key source" of that exposure.[11] Combined with insufficient funding allocations for climate resilience, greater dependence on federal funds could reinforce the lack of progress in reducing fiscal exposure associated with climate change risks.

Community relocation is one example of a disaster risk-reducing activity that targets a specific climate change impact like SLR.[12] It can be a costly undertaking, ranging between $200,000 and $1 million per capita, and may require decades to complete.[13] While individual agencies including the Federal Emergency Management Agency (FEMA) and Department of Housing and Urban Development (HUD) have made ad hoc efforts to fund climate migration activities, a broader view of spending indicates that federal investment in this area remains limited and is mostly provided in the post-disaster environment.[14] SLR is considered a slow-onset event, which is defined as an event that "[evolves] gradually from incremental changes occurring over many years or from an increased frequency or intensity of recurring events."[15] Even if foreseeable, slow-onset events often receive less attention than rapid-onset disasters like hurricanes.[16] An analysis of FEMA's own funding history illustrates this phenomenon. In 2015, GAO reported that the agency utilized an estimated 6% ($222.9 million) of its allocations on pre-disaster mitigation from 2011 to 2014 (figure 2).[17] These are symptoms of continued federal

[11] GAO-19-157SP, p.110-111.
[12] FCCC/TP/2012/7, p.12-13.
[13] Hauer et al., "Sea-level rise and human migration," *Nature Reviews Earth & Environment* 1 (2020), p.34; GAO-20-488; GAO, *Alaska Native Villages: Limited Progress Has Been Made on Relocating Villages Threatened by Flooding and Erosion,* GAO-09-551, (Washington, DC, 2009), p.31-32, https://www.gao.gov/new.items/d09551.pdf.
[14] GAO-20-488, p.30-33, 37; GAO, *Hurricane Sandy*: *An Investment Strategy Could Help the Federal Government Enhance National Resilience for Future Disasters*, GAO-15-515 (Washington, DC, 2015), p.31-32, https://www.gao.gov/products/GAO-15-515. For example, FEMA's Pre-disaster Mitigation Grant Program and HUD's National Disaster Resilience Competition – both of which aim to address certain hazards and build resilience before disasters occur.
[15] This is the definition for slow-onset events that is recognized by the United Nations Framework Convention on Climate Change (UNFCCC). Siegele L., *Loss and Damage: The Theme of Slow Onset Impact*, 2012, Germanwatch; Aside from SLR, slow-onset events also include "increasing temperatures, ocean acidification, glacial retreat and related impacts, salinization, land and forest degradation, loss of biodiversity and desertification." UNFCCC, Technical Paper, FCCC/TP/2012/7, https://unfccc.int/resource/docs/2012/tp/07.pdf.
[16] Jonathan Boston, Panda, A., Surminski, S., "Designing a funding framework for the slow-onset impacts of climate change," The London School of Economics and Political Science (LSE) Grantham Research Institute on Climate Change and the Environment, August 18, 2020, https://www.lse.ac.uk/granthaminstitute/news/designing-a-funding-framework-for-the-slow-onset-impacts-of-climate-change/.
[17] GAO-15-515, p.32.

emphasis on rapid-onset events and post-disaster response, and an inadequate effort to prevent future damages to the nation's environment, economy, and public safety and health. Not enough resources are presently being aimed at actions that would proactively reduce the high cost of familiar climate hazards.

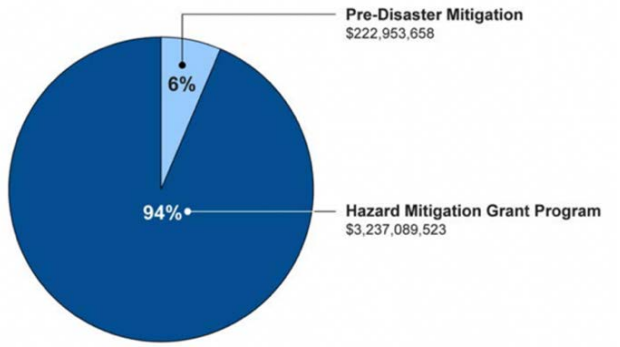

Figure 2. FEMA Pre-Disaster Mitigation Allocations and Hazard Mitigation Grant Program Estimated Awards from FY2011-FY2014. (GAO analysis of FEMA data, GAO-15-515, 2015.)

A 2018 report by the National Institute of Building Sciences (NIBS) asserted that, by investing in certain types of resilience projects to protect lives and property, communities can reap benefits that would outweigh the eventual cost of foregoing those investments.[18] Yet, there is no formal guide at the national level to select such investments. As of October 2019, the federal government did not have a strategic approach to investing in climate resilience projects.[19] The lack of leadership and guidance on how to prioritize funding is one of the reasons why both fiscal exposure and disaster mitigation remain problematic. For example, in lessons learned following Hurricane Sandy, GAO found that the focus of federal funding on the post-disaster environment hindered officials' capacity to invest in measures that could improve resilience against future

[18] Multihazard Mitigation Council, National Institute of Building Sciences (NIBS), *Natural Hazard Mitigation Saves: 2018 Interim Report,* (Washington, DC, 2018).
[19] GAO, *Climate Resilience: A Strategic Investment Approach for High-Priority Projects Could Help Target Federal Resources,* GAO-20-127 (Washington, DC, 2019), p.19-20, https://www.gao.gov/products/GAO-20-127.

disasters. Officials expressed that "a more effective approach to disaster resilience would be to plan and implement hazard mitigation before a disaster occurs."[20]

Climate migration is not a new phenomenon in the United States, but experts and federal officials have said that little research has been done on it as a specific resilience strategy.[21] The intersection of climate change and migration requires more attention from the federal government if experts anticipate that vulnerable communities will face slow-onset events like SLR, requiring residents to determine if, when, or how to relocate based on place-based needs. As stated in the NCA, "coastal communities will be among the first in the Nation to test existing climate-relevant legal frameworks and policies against [climate change impacts] and, thus, will establish precedents that will affect both coastal and non-coastal regions."[22]

History & Background

Climate migration is regarded as a policy area that remains underdeveloped despite the global impact that climate change is expected to have on society. Compared to the amount of data on climate and human mobility that governments and multilateral institutions possess, international experts have articulated that "discussion of policies to manage environmental migration is in its infancy."[23] The concept of migration due to environmental hazards, specifically those exacerbated by human activity, can be traced back to environmental analyst Lester Brown's 1976 account of "ecological refugees" retreating from land degradation and desertification caused by overgrazing in parts of Sub-Saharan Africa.[24] While this description was a secondary topic within a broader discussion focused on global population growth concerns, it signified early interest in migration patterns triggered in part by undesirable environmental conditions. The issue became a

[20] GAO-15-515, p.34.
[21] GAO-20-488, p.30.
[22] USGCRP, *Fourth National Climate Assessment*, p.324.
[23] Susan Martin, "Climate change, migration, and governance," *Global Governance* (2010) 16, 397–414, https://publications.iom.int/system/files/pdf/migration_and_environment.pdf.
[24] Brown, Lester, Patricia L. McGrath, and Bruce Stokes, "Twenty-Two Dimensions of the Population Problem," *Worldwatch Paper 5*, Worldwatch Institute, March 1976 p. 39-40, https://files.eric.ed.gov/fulltext/ED128282.pdf.

more glaring concern in the research and policy arenas in the decades that followed. Climate migration gained prominence on the international stage after 1990, when the United Nations Intergovernmental Panel on Climate Change (IPCC)—the UN body responsible for assessing climate science—released a key report predicting that migration "would likely be the most significant short to mid-term outcome of anthropogenic climate change."[25] The study of U.S. climate migration is comparatively new. In 2016, some of the first modeling of U.S. migration caused by SLR was published in *Nature Climate Change*.[26] The study revealed that a 1.8 meter SLR scenario would push 13.1 million people away from receding coastlines by 2100. When accounting for indirect impacts that reach farther inland (e.g. rising rivers, saltwater intrusion, etc.), as many as 50 million more people in metropolitan areas would be affected.[27]

SLR has already threatened low-lying wetlands in the United States. Some of the first instances of climate migration efforts began to unfold in Alaska in the late 1990s and early 2000s. Relocation efforts of indigenous communities in Shishmaref and Newtok are two examples. Shishmaref, a traditional Inupiat village located on a barrier island, has experienced chronic erosion and SLR is expected to cause more coastal flooding while the community is running out of space to move away from the shoreline.[28] As early as 1953, the U.S. Army Corps of Engineers (hereafter referred to as the Corps) had already assessed that relocation would be cheaper than building a seawall to protect against bluff erosion. The villagers later voted to relocate in 1973

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[25] "About the IPCC," International Panel on Climate Change (IPCC), https://www.ipcc.ch/about/; Elizabeth Marino, "The long history of environmental migration: Assessing vulnerability construction and obstacles to successful relocation in Shishmaref, Alaska." *Global environmental change* 22, no. 2 (2012): p.376; "IOM Outlook on Migration, Environment and Climate Change," International Organization for Migration (IOM), 2014, p.66, https://publications.iom.int/system/files/pdf/mecc_outlook.pdf.

[26] Hauer et al., "Sea-level rise and human migration," *Nature Reviews Earth & Environment* 1 (2020); Abrahm Lustgarten, "Climate Change Will Force a New American Migration," September 15, 2020, *ProPublica*, https://www.propublica.org/article/climate-change-will-force-a-new-american-migration.

[27] Hauer et al., "Millions projected to be at risk from sea-level rise in the continental United States," *Nature Climate Change* 6, p.691; Abrahm Lustgarten, "Climate Change Will Force a New American Migration," September 15, 2020, ProPublica.

[28] State of Alaska, Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs, Alaska Community Coastal Protection Project, Shishmaref Project Page, https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/AlaskaCommunityCoastalProtectionProject/Shishmaref.aspx.

when the area experienced two severe fall storms that caused widespread erosion and damage. However, that decision was reversed after the chosen relocation site was deemed uninhabitable due to "an extensive layer of permafrost."[29] It was not until 2002 that the village voted again to relocate, after suffering more weather-related problems. Between the 1970s and early 2000s, several protective measures against erosion were attempted, and approximately $5 million was spent on these projects. By 2009, there was still no agreement among federal, state, and village officials on relocation sites that would be safe and suitable for the needs of the villagers of Shishmaref and two other villages (Kivalina and Shaktoolik) that experts anticipated would need to move "all at once."[30]

In Newtok, riverbank erosion had already been identified as a chronic problem by 1983.[31] Upon the request of the (then) City of Newtok, consultants were hired to conduct the Ninglick River Erosion Assessment, which found that if erosion was left unchecked, it would "endanger structures within 25 to 30 years" (i.e. 2008-2013).[32] Similar to what the Corps found in Shishmaref in the 1950s, consultants examining the situation in Newtok concluded in 1984 that relocating "would likely be less expensive than trying to hold back the Ninglick River."[33] In 1994, the village began a concerted effort to resettle in Mertarvik on Nelson Island, and over a decade later, the Newtok Planning Group—comprised of federal, state, regional and village partners—was established in 2006 to help accelerate the migration process. More recently, the

[29] GAO, *Flooding and Erosion in Alaska Native Villages,* GAO-04-142 (Washington, DC, 2004), p.33-34, https://www.gao.gov/new.items/d04142.pdf.
[30] GAO-09-551, p.31-32.
[31] GAO-20-488, p.15.
[32] State of Alaska, Department of Commerce, Community, and Economic Development, Division of Community and Regional Affairs, Alaska Community Coastal Protection Project – Newtok Planning Group: Newtok Village Relocation History, https://www.commerce.alaska.gov/web/dcra/planninglandmanagement/NewtokPlanningGroup/NewtokVillageRelocationHistory/NewtokHistoryPartTwo.aspx.
[33] Woodward-Clyde Consultants, "Ninglick Erosion Assessment - Addendum," November 29, 1984, https://www.commerce.alaska.gov/web/Portals/4/pub/Ninglick_River_Erosion_Assessment_Addendum_November_29,_1984.pdf.

Denali Commission was designated in 2015 to be the lead agency to help coordinate resources and assist communities.[34]

The ongoing climate migration efforts in Shishmaref and Newtok, among other indigenous communities, have been associated with two key underlying weaknesses: (1) lack of clarity on federal leadership around coordination and (2) challenges to accessing funding for short- and long-term climate resilience projects. Newtok's relocation is seen as successful compared to other vulnerable villages, but there is room to improve processes and support for migration operations. Government officials and Alaskan stakeholders said that residents are still exposed to "increased disaster risks because the relocation to Mertarvik will not be complete before coastal erosion and flooding make Newtok uninhabitable."[35] Projects have been prolonged for decades due to logistical, administrative, and financial constraints. Congress has been informed of the obstacles and varying success of climate migration in Alaska through several GAO reports in the past twelve years, including in 2009, 2019, and 2020, but improvements are slow.[36] As a result of the 2009 report, the White House directed the Denali Commission to create the Village Infrastructure Protection (VIP) Program in 2015 to provide additional support to rural Alaskan communities threatened by environmental hazards.[37] Nevertheless, financial support remained inadequate to address the risks places like Shishmaref, Newtok and others face. As of March 2019, the VIP Program did not have a formal unmet need estimate, but the Commission wrote that it was "certainly hundreds of millions" of dollars.[38]

The delayed progress of these relocation projects reflects the federal government's overall inexperience in handling climate migration. In addition to there being no federal entity

[34] GAO-20-488, p.16.
[35] GAO-20-488, p.17.
[36] For example: GAO-09-551, GAO-20-127, GAO-20-488.
[37] Denali Commission, "Village Infrastructure Protection," https://www.denali.gov/programs/village-infrastructure-protection/.
[38] Denali Commission, Village Infrastructure Protection Program (VIP Program), Fact Sheet, March 2019, https://www.denali.gov/wp-content/uploads/2019/03/VIP-fact-sheet-web.pdf.

designed to lead and coordinate processes, existing law and disaster aid center on the response-side of natural hazards and disasters. Today's "federal programs are not designed to support climate resilience efforts in general or climate migration efforts specifically."[39] Where there has been limited support, individual agencies were able to provide "ad hoc funding through existing federal programs for projects that may convey some climate resilience benefits."[40] Investments in climate resilience are generally siloed within the bounds of agencies' mission areas and authorized programs, as well as guidelines provided by the Office of Management and Budget (OMB).

There are a limited number of programs dedicated to pre-disaster climate resilience, and none are specifically meant to tackle climate migration. Coastal communities that did decide to relocate have received some federal funding through existing programs. The 1988 Stafford Disaster Relief and Emergency Assistance Act (Section 203) authorized FEMA's Pre-Disaster Mitigation (PDM) Grant Program to assist states, local governments, territories, and tribes in improving resilience against natural hazards before a disaster occurs.[41] The Stafford Act does not explicitly mention climate change, but individual projects funded by PDM funding "may convey climate resilience benefits" through flood diversion and storage, and green infrastructure, among other measures.[42] Historically, the program's budget has fluctuated and individual awards have been capped, thereby limiting the impact that potentially large-scale projects could have, per GAO interviews with FEMA officials. The Disaster Relief and Recovery Act of 2018 (DRRA) included amendments to the Stafford Act, subsequently replacing the PDM Grant with the Building Resilient Infrastructure and Communities (BRIC) program. FEMA was still in the process of finalizing a program policy for it earlier this year. The notices of funding opportunities

[39] GAO-20-488, p.30.
[40] GAO-20-488, p.30; GAO-20-127, p.15.
[41] FEMA, "Pre-Disaster Mitigation (PDM) Grant," https://www.fema.gov/grants/mitigation/pre-disaster; GAO-20-488, p.31-32.
[42] GAO-20-488, p.31.

(NOFO) for the BRIC program for FY2020 is $500 million, and annual funding is expected to increase depending on disaster activity.[43] While the NOFO also does not reference climate or migration, it does specify the following program priorities that could convey climate resilience benefits through approved projects:[44]

- Incentivize public infrastructure projects;
- Incentivize projects that mitigate risk to one or more lifelines;
- Incentivize projects that incorporate nature-based solutions; and,
- Incentivize adoption and enforcement of modern building codes.

FEMA's Flood Mitigation Assistance (FMA) Grant Program, which is part of the National Flood Insurance Reform Act (1994), is another example of a proactive program which intends to build resilience and reduce risk to populations and structures from future hazard events. This, too, can convey resilience benefits and help reduce reliance on federal disaster aid over time, but was not originally intended for climate migration projects.

The process of designating a federal entity to lead on climate migration is currently in limbo. In December 2016, there was an attempt to establish an Interagency Working Group on Community-Led Managed Retreat and Voluntary Relocation.[45] Eleven federal agencies, including the Department of Agriculture, HUD, the Denali Commission, FEMA, NOAA, the Corps, and five others would have signed a memorandum of understanding to establish the working group with the intention to create a framework for climate migration that "identified the federal role in a community-led process to address current and future needs."[46] This did not move forward with the transition to President Trump's administration. There was no resultant guidance set forth that would facilitate the development of "federal institutional capability to assist

[43] FEMA, "Fiscal Year 2020 Notices of Funding Opportunities for Hazard Mitigation Assistance Grants," August 2020, https://www.fema.gov/grants/mitigation/fy2020-nofo; GAO-20-488, p.32.
[44] FEMA, "The Department of Homeland Security (DHS) Notice of Funding Opportunity (NOFO) FY 2020 Building Resilient Infrastructure and Communities," August 2020, https://www.fema.gov/sites/default/files/2020-08/fema_fy20-bric-notice-of-funding-opportunity_federal-register_August-2020.pdf.
[45] Christopher Flavelle, "Obama's Final Push to Adapt to Climate Change," *Bloomberg News*, December 15, 2016, https://www.bloomberg.com/opinion/articles/2016-12-16/obama-s-final-push-to-adapt-to-climate-change.
[46] GAO-20-488, p.39.

communities with retreat or relocation."[47] According to GAO, the federal government has not only taken inadequate action in response to recommendations on enhancing climate resilience with respect to migration efforts, it has also regressed in terms of reducing fiscal exposure from climate change risks.[48]

Key Actors

Climate change is a cross-cutting subject that will involve many actors in the progression of migration activities. Coastal communities are at the center of this matter, as they are directly exposed to hazards that are, or will be disrupting their lives. As of 2019, more than 126 million people (approximately one-third of the total U.S. population) reside in coastal counties, many of whom fall under the "elevated coastal hazard risk category."[49] They are vital contributors to the economy, producing 46% of the country's economic output ($8.6 trillion in goods and services) and providing 56.8 million jobs.[50] The diverse circumstances and needs at the local level within this group are critical to planning effective climate migration operations across the coastline.[51]

Stakeholders including the scientific community, advocacy organizations, and other international entities are likely to influence the design of prospective strategies around climate migration as well. Expert organizations and environmental groups produce and disseminate information and best practices based on the latest science, which are intended to inform decisionmakers and stakeholders when creating and implementing policies. At the international level, institutions such as the IPCC, UN Environment Programme, International Organization for Migration (IOM), World Bank, and other coalitions monitor and share information on country-level data and policies on climate change and migration around the world. At the same time, there

[47] GAO-20-488, p.39.
[48] GAO-19-157SP, p.110-111; GAO-20-488, p.40.
[49] NOAA, Office of Coastal Management (OCM), "Fact Sheet: NOAA's National Coastal Zone Management Program - Funding Summary 2019," https://coast.noaa.gov/data/czm/media/funding-summary.pdf; NOAA, OCM, "Fast Facts - Economics and Demographics," https://coast.noaa.gov/states/fast-facts/economics-and-demographics.html.
[50] NOAA, OCM, "Fact Sheet: NOAA's National Coastal Zone Management Program - Funding Summary 2019."
[51] GAO-20-488, p.19, 29, 52. Place-based needs and cultural sensitivities around community relocation are discussed throughout the July 2020 GAO report.

are interest groups that lobby for or against progressive environmental policies being considered by the U.S. government. They may advocate for environmental protection and justice (e.g. the Environmental Defense Fund, Natural Resources Defense Council, Greenpeace), or for deregulation of environmental policies and skepticism of global warming (e.g. American Enterprise Institute, Competitive Enterprise Institute, Cato Institute).[52]

All levels of the U.S. government are engaged in climate policy, from the federal level down to the local level. Federal agencies are widely impacted by climate and would be expected to implement resilience policies. In 2013, President Obama issued an Executive Order to create a Task Force on Climate Preparedness and Resilience comprised of 26 state, local, and tribal leaders, and an interagency Council on Climate Preparedness and Resilience that involved over 25 agencies in order respond to community needs across the country, and "to develop, coordinate, and implement priority Federal actions related to climate preparedness."[53] These groups were dismantled in 2017 by President Trump.[54] Even so, it is arguable that the leaders and agencies that had been convened will remain relevant in their respective roles to address coastal hazards moving forward. At the federal level alone, the departments and offices include: the Global Change Research Program (USGCRP), OMB, HUD, Department of the Treasury, Department of Transportation, Department of Agriculture, Department of Commerce (including NOAA), Department of the Interior, Environmental Protection Agency, Department of Homeland Security, Department of Energy, Department of Health and Human Services, Department of State, National Science Foundation, Department of Defense (including the Army Corps of Engineers), Council of Economic Advisers (CEA), Council on Environmental Quality (CEQ), and Office of Science and Technology Policy (OSTP).

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[52] "Global Warming Skeptic Organizations (2013)," Union of Concerned Scientists, https://www.ucsusa.org/resources/global-warming-skeptic-organizations.

[53] Executive Order 13653 of November 1, 2013, Preparing the United States for the Impacts of Climate Change, 78 C.F.R. 66817-66824, https://www.govinfo.gov/content/pkg/FR-2013-11-06/pdf/2013-26785.pdf

[54] Executive Order 13783 of March 31, 2017, Promoting Energy Independence and Economic Growth, 82 C.F.R. 16093-16908. https://www.govinfo.gov/content/pkg/FR-2017-03-31/pdf/2017-06576.pdf.

Policy Proposal

The proposed policy, titled as the "Disaster Mitigation and Coastal Resilience Act," is an expansion of NOAA's role in accounting for changes along the U.S. coast by requiring the Secretary of Commerce (hereafter referred to as the Secretary) to establish a new coastal resilience program to improve climate change preparedness.[55] Pursuant to Section 309 of the Coastal Zone Management Act of 1971 (CZMA), the agency has implemented the Coastal Zone Enhancement Program, which last accepted grant proposals in 2018.[56] The new program is modeled after Sec. 309 by focusing on the following "coastal zone enhancement objectives" [57] under subsection (a) of the section:

2. Preventing or significantly reducing threats to life and destruction of property by eliminating development and redevelopment in high-hazard areas, managing development in other hazard areas, and anticipating and managing the effects of potential sea level rise and Great Lakes level rise.
5. Development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources.

However, the proposed grant is distinct from the Coastal Zone Enhancement Program in its goal to increase federal capacity to support climate migration activities by making $100,000,000 available to the Secretary each year for this direct grant through FY2030, and its removal of restrictions on acquisition and capital projects.[58] It would create up to 20 awards to provide financial and technical support to eligible states and territories (hereafter referred to as states) that

[55] This would be similar to what is put forward in the Coastal State Climate Preparedness Act of 2019 (H.R. 3541), which was introduced in the House by Representative Salud Carbajal (D-CA-24) on June 27, 2019. The bill aligns with the goals of coastal resilience but does not explicitly mention resilience.
[56] GAO-48-488, p.34.
[57] 16 U.S.C. § 1456b. Coastal Zone Enhancement Grants (Section 309), https://coast.noaa.gov/czm/act/sections/#309.
[58] NOAA, OCM, Coastal Zone Management Act (CZMA) Section 309 Program Guidance: 2021 to 2025 Enhancement Cycle, June 2019, https://coast.noaa.gov/data/czm/media/Sect-309_Guidance_2021-2025.pdf.

have developed climate resilience plans to reduce their exposure to environmental risks that have made, or will imminently make coastal communities uninhabitable.

Policy Implementation Tool

The CZMA is a voluntary program, and the 34 states that currently participate each develop and implement a coastal management program (CMP) that must first be approved by the federal government as required by the law. CMPs are "comprehensive management plans that describe the uses subject to the management program, the authorities and enforceable policies of the management program, and the boundaries of the state's coastal zone, the organization of the management program, and related state coastal management concerns."[59] Every level of government is involved in coastal management under CZMA, and this would also apply to the proposed grant program.

At the federal level, its policies and provisions are implemented by the Department of Commerce through NOAA's Office for Coastal Management (OCM).[60] Only states with NOAA-approved CMPs and resilience plans would be eligible to apply for funding. In those resilience plans, states will be expected to identify localities that need urgent action to address hazards that are making residences uninhabitable and other structures unsustainable in their current locations. In addition, a disaster need not be declared by the president in order to make states eligible to apply. Proposals would be submitted directly to the agency's notice of funding opportunity (NOFO) associated with this grant program. Once the grant agreement is finalized through a competitive process, state and local governments would then execute the approved activities that fall under the coastal zone enhancement objectives targeted by this program.

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[59] Alaska is currently the only eligible coastal state that is not participating in the program, as they voluntarily withdrew in 2011. Thus, 34 of 35 eligible states currently have federally approved CMPs. NOAA, OCM, CZMA – Federal Consistency Overview, February 24, 2020, https://coast.noaa.gov/data/czm/consistency/media/federal-consistency-overview.pdf.

[60] Congressional Research Service (CRS), *Coastal Zone Management Act (CZMA): Overview and Issues for Congress,* R45460, January 2019, https://fas.org/sgp/crs/misc/R45460.pdf.

Similar to the Coastal Zone Enhancement Program's requirements outlined in Sec. 309, subsections (d) and (e), the Secretary will be responsible for promulgating regulations concerning this grant, and state contribution will not be required for any proposal for which funding is awarded. However, this resilience program would differ from Sec. 309's funding provision in subsection (f) by establishing a higher limit for the amount the Secretary can utilize for implementing the new program. Compared to the yearly $10,000,000 limit for the Coastal Zone Enhancement Grant, the maximum would be changed to $100,000,000 annually for the new program.[61] The tenfold increase is intended to enable NOAA to finance longer-term (10+ years) disaster mitigation and coastal resilience projects, as well as low-cost acquisition and capital projects that states have determined to be critical for vulnerable coastal communities in their resilience plans.

Policy Authorization Tool

This policy would be proposed in the form of an amendatory bill—the "Disaster Mitigation and Climate Resilience Act"—that would add a section to the CZMA describing the grant program, and reauthorize the appropriations for CZM Program.[62] After being introduced, the bill would be debated in the assigned standing committee for approval before moving to the Senate floor for a vote. Working with colleagues in the House of Representatives who support this proposal could present an opportunity to introduce a companion bill in the House around the same time. That bill would undergo committee deliberations and a floor vote of its own and would require a simple majority for passage. If the resulting bills are different, both chambers must work in a conference committee to reach a consensus and finalize the bill before sending to the president. It would then be signed into law or vetoed within 10 days. Should Congress choose to override the veto, it would need a two-thirds vote in both the House and Senate.[63]

[61] 16 U.S.C. § 1456b. Coastal Zone Enhancement Grants (Section 309), https://coast.noaa.gov/czm/act/sections/#309.
[62] 16 U.S.C. § 1456b. Coastal Zone Enhancement Grants (Section 309), https://coast.noaa.gov/czm/act/sections/#316.
[63] U.S. Constitution, art. 1, sec. 7, https://www.law.cornell.edu/constitution/articlei; U.S. Senate Glossary, "Override of a Veto," https://www.senate.gov/reference/glossary_term/override_of_a_veto.htm.

Policy Analysis

The federal government has never implemented a program designed specifically for climate migration activities as a resilience measure. The grant program set forth in the Disaster Mitigation and Coastal Resilience Act is an opportunity to fill that gap by providing financial support to communities that have federally vetted plans to increase their resilience against slow and rapid-onset events that endanger lives and economies across the U.S. coastline. According to GAO interviews, NOAA officials have indicated that assistance for coastal zone management is in high demand, and state coastal zone managers have expressed that the agency's financial assistance was critical to their work, albeit insufficient. Stakeholders also emphasize the value and importance of this federal support, and that it should be increased.[64]

In terms of making financial support for climate migration more effective, this grant program could tackle certain weaknesses that GAO found in examples of past federal support for voluntary relocation efforts in states like Alaska, Maryland, and Louisiana. First, it would eliminate the administrative requirement that funding is only made applicable to specified disasters that have already taken place. States would have greater access to federal resources without first experiencing a declared disaster to be eligible for assistance, and potentially face less competition with other types of infrastructure projects.[65] This would lessen the financial

[64] CRS, *Coastal Zone Management Act (CZMA): Overview and Issues for Congress,* R45460, January 2019, p.14, 16, https://fas.org/sgp/crs/misc/R45460.pdf; GAO, *Climate Change: Information on NOAA's Support for States' Marine Coastal Ecosystem Resilience Efforts*, GAO-16-834, September 28, 2016, p.16, https://www.gao.gov/products/GAO-16-834.

[65] Lessons learned from the Canadian government's Disaster Mitigation and Adaptation Fund (DMAF), indicated that a source of funding explicitly for resilience projects enabled proposals to avoid competing with other infrastructure projects for funding as they do in other programs that cover multiple eligible project categories. DMAF itself was created in 2018 with the specific intention of financing climate resilience projects over a 10-year period using approximately US$1.5 billion. GAO-20-127, p.53-54; Government of Canada, "Backgrounder: Disaster Mitigation and Adaptation Fund," May 17, 2018, https://www.canada.ca/en/office-infrastructure/news/2018/05/backgrounder-disaster-mitigation-and-adaptation-fund.html.

constraints on enhancing resilience, given that the majority of federal funds for hazard mitigation have been provided in the post-disaster recovery phase.

As seen in Newtok, the village's request for a formal disaster declaration in 2016 was rejected by the president because disaster aid provided under the Stafford Act cannot be applied to slow-moving disasters (a.k.a. slow-onset events) such as coastal erosion caused by SLR and storm surge. This categorization subsequently posed an obstacle to the community in its search for financial assistance under 'non-disaster' circumstances even though the Village Council had already agreed years earlier that relocation was necessary.[66] The proposed program removes this restriction by opening up resources to vulnerable communities that have identified proactive climate migration plans to enhance resilience against slow-onset events.

Second, the implementation of this grant can assist in improving strategies and impacts of federal investments in climate resilience projects. In interviews conducted by GAO, stakeholders expressed that using both existing and new funding "in a strategic, coordinated way could help increase the impact…and makes it less likely that high-priority projects fall through the cracks and more likely that these projects will help agencies work toward a common strategic goal."[67] According to GAO and CRS reporting, questions have been raised regarding how effectively CZMA has been implemented by NOAA over the years. Weaknesses linked to the agency's limited use of performance data, assistance to states for coastal ecosystem resilience, and grant approval processes were causes for concern about the program's effectiveness.[68] This grant program's provisions would intend to complement and improve coastal zone management by strengthening project proposal evaluations and prioritization strategies, funding capacity, and performance monitoring.

[66] GAO-20-488, p.16-17.
[67] GAO-20-127, p.56.
[68] CRS, R45460, p.12-13.

By requiring states to have NOAA-approved CMPs and resilience plans prior to applying for the grant, the Disaster Mitigation and Coastal Resilience Grant program necessitates federal engagement with states that generates agreement amongst the levels of government that are involved, including the local community that has decided to relocate. This could contribute to the efficiency of the grant program on the ground by creating a degree of collective agreement before submitting an actionable proposal, and simultaneously expanding adoption of resilience practices. Furthermore, the requirement can help account for the unique cultural, socioeconomic, and political characteristics of U.S. coastal communities in planning prospective climate migration activities. In its recommendations to Congress, the GAO has highlighted the effectiveness of community-led planning because it can also lead to program efficiency by "[expediting and building] public support for climate migration" based on interviews with federal officials and stakeholders in Alaska and Maryland.[69] Since the concept of locally-driven, voluntary climate migration planning is built into the design of grant program, the resultant proposals and approved projects could help improve implementation by effectively addressing the specific needs of these communities. With little consensus, poor planning, and lack of consideration towards place-based factors, the parties involved in executing a partial or full relocation could face administrative and logistical delays that would waste NOAA funding.

Increasing national investment in climate resilience through the enactment of this proposal could also save the federal government hundreds of millions of dollars. This category of investment has been touted in the environmental policy sphere as an effective method of reducing future disaster costs.[70] Disaster losses in 2017 exceeded $300 billion, which was 35% of the building value at the time. The World Resources Institute (WRI), an international environmental

[69] GAO-20-488, p.43-44.
[70] GAO-20-127; Bob Simison, "Investing in Resilience," International Monetary Fund (IMF), *Finance & Development*, December 2019, Vol. 56, No. 4, https://www.imf.org/external/pubs/ft/fandd/2019/12/pdf/climate-change-and-investing-in-resilience-simison.pdf.

research organization, listed the U.S. as one of the top 10 countries with the highest increase in urban assets to be damaged by coastal flooding in 2030. As depicted in figure 3, climate-driven coastal flooding is projected to see an additional $6.5 billion in urban property damages.[71] WRI has argued that investing in adaptation and flood defense will not only protect millions of lives and urban property, but also support job creation and economic growth.

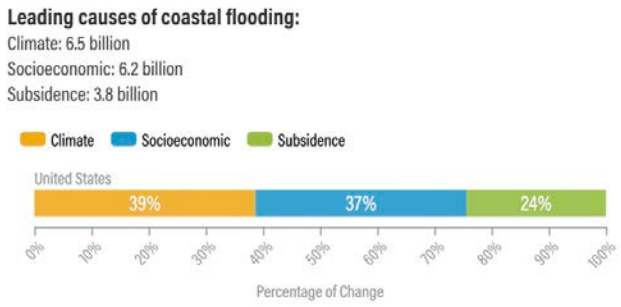

Figure 3. Damage to the United States of America's Urban Assets by Coastal Flooding. (Aqueduct Floods, World Resources Institute, 2020.)

In 2019, the NIBS released a report on the value of hazard mitigation to reduce risk as America faces natural disasters that are increasing in strength and frequency. It highlighted the benefits of natural hazard mitigation, including the following findings on federal grants and their resultant benefits.[72]

- The overall benefit-cost ratio (BCR) for federal grants is about 6:1. For every $1 spent on mitigation costs, $6 can be saved in future disaster costs. For example, if the cost of investment is about $27.4 billion, the estimated benefit is $157.9 billion (figure 4).
- Mitigation could save the federal treasury about $930 million per year (figure 5). The study found that an annual average of $10 billion in federal funds is spent on disasters via

[71] Samantha Kuzma and Tianyi Luo, "The Number of People Affected by Floods Will Double Between 2010 and 2030," World Resources Institute, April 23, 2020, https://www.wri.org/blog/2020/04/aqueduct-floods-investment-green-gray-infrastructure.
[72] NIBS, *Natural Hazard Mitigation Saves: 2019 Report*, December 2019, https://www.nibs.org/page/mitigationsaves. Per NIBS, one of the aims of Mitigation Saves is "to assist Congress and policymakers to develop effective federal programs that support pre-disaster mitigation and encourage more mitigation investments from the public and private sectors."

individual and public assistance, as well as other costs. The natural hazard mitigation measures studied in the report are estimated to lower those expenditures by ~8% (approximately $800 million per year), and to increase tax revenues by approximately $130 million per year as a result of fewer tax deductions for disaster-related losses. Figure 5 shows the breakdown of the benefits to the federal treasury stemming from mitigation activities.

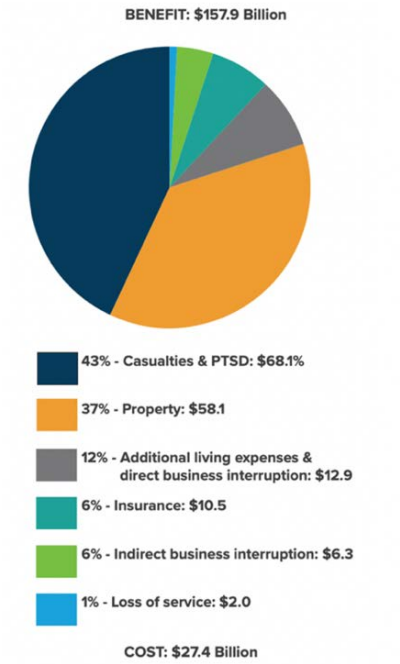

Figure 4. Total Costs and Benefits of 23 Years of Federal Mitigation Grants. (NIBS, 2019.)

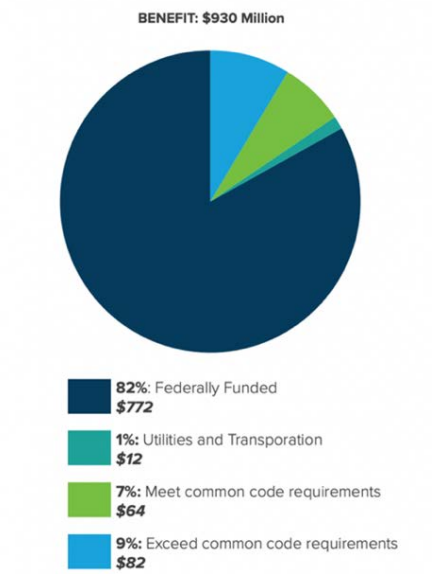

Figure 5. Annual Savings to the Federal Treasury Resulting from Natural Hazard Mitigation. (NIBS, 2019.)

It is worth noting the BCR for federal spending on hazard mitigation has increased in the past 15 years. A 2005 NIBS study had estimated a 4:1 ratio, but the increase to 6:1 makes a stronger case

for proactive investment.[73] In its latest report, the NIBS examined public sector mitigation programs of FEMA, HUD, and the Economic Development Administration (EDA) administered over 23 years for four types of natural hazards (coastal and riverine flooding, hurricanes, earthquakes, and fires) in its analysis. With regard to land use planning to reduce flood hazard, the report stated that although "the costs of property acquisition and demolition or relocation are high, future losses are completely avoided."[74] The added benefits of acquisition can include the creation of space for parks. Thousands of property acquisitions have been completed with FEMA's involvement in the past decade. However, in comparison with the 5 million properties associated with National Flood Insurance Program (NFIP) policies as of 2016, relocations and acquisitions account for a very small percentage of mitigation actions.[75] These evaluations of acquisition and relocation as climate resilience measures offer insight into the positive economic impact the proposed grant program could have on coastal communities at high risk from coastal hazards.

The majority of benefits (80%) from hazard mitigation were savings associated with casualties and post-traumatic stress disorder (43%) and property (37%), as illustrated in figure 4, suggesting that mitigation helps in the protection of people and public health, as well as residential and business property. While the coverage of hazards in the report was broader than coastal flooding and the focus was on natural hazard mitigation for components of infrastructure and buildings, the report shows that public sector support has a proven, and relatively long-term record of implementing grants that led to significant savings benefits. NIBS found that every state in the contiguous U.S. experienced at least $10 million in benefits from the considered federal grants, and that the majority of those states enjoyed $1 billion in benefits.[76] As an addition to the

[73] Leonardo Martinez-Diaz, "Investing in Resilience Today to Prepare for Tomorrow's Climate Change," *Bulletin of the Atomic Scientists,* vol. 74, no. 2 (2018), p.66-67, https://doi.org/10.1080/00963402.2018.1436805.
[74] NIBS, *Natural Hazard Mitigation Saves: 2019 Report*, p.183-184.
[75] NIBS, *Natural Hazard Mitigation Saves: 2019 Report*, p.183-184.
[76] NIBS, *Natural Hazard Mitigation Saves: 2019 Report*, p.19.

existing federal grants related to hazard mitigation, the proposed program could help deliver additional benefits to eligible states in the next decade by supporting projects that protect lives and prevent millions of dollars in economic damages and disaster costs. In the larger picture of federal spending, it could also help shift the government's priorities away from post-disaster aid, and towards pre-disaster preparedness through investment in resilience.

Despite these benefits to society and government, this policy option has a number of potential weaknesses that impede its ability to support communities threatened by coastal hazards. The Disaster Mitigation and Coastal Resilience Grant program is not guaranteed to meet the demands of climate migration activities in a few ways, making it less effective and efficient. The grant may fall short in providing states with enough resources to finance and complete relocations from beginning to end, which has hampered these projects over time. For a single relocation effort alone, costs can be expected to be well over $100 million for a small community. In the case of Newtok, which is home to about 400 people, Denali Commission officials estimated in 2019 that it would take ~$115 million in order to move from Mertarvik.[77] That figure included the development of the new site at Mertarvik, building of sufficient infrastructure, and cleanup of the Newtok site. From FY2016 to FY2018, the Commission invested $34 million for Village Infrastructure Protection (VIP) related initiatives.[78] However, as the Commission's cost estimate suggests, the level of investment in the move to the new site leading up to 2019 had been insufficient. In addition to concerns around what adequate support would entail, some stakeholders expressed concern that the creation of a new funding source could unintentionally hinder climate change progress "mainstreaming of climate change considerations into existing federal programs or lead to the elimination of other sources of funding for climate resilience projects."[79] In this sense, the grant program could inadvertently deemphasize the value of other

[77] GAO-20-488, p.13, 17.
[78] Denali Commission, "Village Infrastructure Protection," https://www.denali.gov/programs/village-infrastructure-protection/.
[79] GAO-20-127, p. 26

federal climate change programs, thereby weakening the reach of national climate resilience efforts.

In addition, this program does not rectify a notable administrative gap that has been a key weakness in community relocation projects to date—the lack of federal leadership on climate migration.[80] While NOAA does not have statutory authority to organize federal assistance for climate migration, this grant is designed to support climate migration projects within the bounds of the CZMA. It would be an extension of existing coastal management policy implemented by OCM and state CMPs. In other words, the grant program does not create a national mechanism for coordinating climate migration activities beyond the National Coastal Zone Management Program and other engaged agencies and stakeholders. In the continued absence of clear federal leadership, we could expect to see inefficiency through drawn-out planning and implementation of relocation projects. This could prolong and increase communities' exposure to coastal hazards. as GAO observed to be the case in Newtok, Alaska and Isle de Jean Charles, Louisiana. It took Newtok 30 years to begin relocating, and Isle de Jean Charles dealt with a complicated resettlement timeline that took over 20 years.[81] Until Congress authorizes a federal entity to coordinate climate migration priorities and activities, this grant could be perceived as an ad hoc NOAA program serving as a limited testing ground for federal support for community-led relocation and climate resilience through an existing coastal management program (i.e. state CMPs under the National Coastal Zone Management Program).

Uncertainty also raises concerns regarding the spending efficiency of the program. Experts and stakeholders alike have emphasized the importance of accounting for uncertainty around the benefits resulting from federal investment in climate resilience projects. GAO not only identified efficiency criteria that could help guide these investments, but also pointed out the

[80] GAO-20-488, p.38-41.
[81] GAO-20-488, p.38-39.

difficulty of estimating the monetary value of some benefits.[82] If much of the benefits of climate resilience are realized far in the future, a potential unintended consequence of the grant could be that the most urgent, short-term projects will receive more attention from CMPs, even with a stringent grant proposal evaluation process overseen by NOAA. This would result in a similar trend as the observed tendency for federal funds to focus on post-disaster response needs.

In addition, the grant's eligibility requirement could weaken the Disaster Mitigation and Coastal Resilience Program's ability to treat coastal communities equitably. Given that only coastal states with NOAA-approved CMPs may apply, the accessibility and distribution of funds rest partially on whether (1) states elect to obtain CMP approval from NOAA, and (2) the level of engagement of those CMPs. Without full participation from coastal states, vulnerable communities could be left without access to funding that is intended to be more inclusive of slow-onset events or non-disaster scenarios. While there are proven incentives for eligible states to participate in CZMA, there is no guarantee that they will continue to do so in the years to come. Alaska is a notable example of this downside to the program's eligibility provision. At present, it is the only eligible state that has chosen not to participate in the CZMA. The state's CMP expired in July 2011, and without renewal, became ineligible for CZMA grants under sections 306, 306A, 308, 309, or 310.[83] Political and industry-related influences may well have contributed to the state legislature's decision to withdraw from the NCZMP.[84] Other CMPs may face discontinuation as a result of state-specific decisions, and they will be disqualified from relevant grants under the CZMA—including this proposed option—despite being prime candidates that have already

[82] GAO-20-127, p.40-41.
[83] "Alaska Coastal Management Program Withdrawal From the National Coastal Management Program Under the Coastal Zone Management Act (CZMA)," 76 Federal Register 39857 (7 July 2011), pp. 39857-39858.
[84] CRS, R45460, January 2019, p.3.; Ryan M. Wilson, "Why Did Alaska Eliminate the Alaska Coastal Management Program?," University of Alaska, 2018, https://scholarworks.alaska.edu/handle/11122/8751; Mark Thiessen, "Coastal Management Initiative Fails by a Heavy Margin," Alaska Journal of Commerce, 2012, http://www.alaskajournal.com/business-and-finance/2012-08-31/coastal-management-initiative-fails-heavymargin#.XB2FW1xKiUk.

locally determined that partial or full community relocation is the most economical, safe, and culturally-sensitive option for their residents.

Political Analysis

The authorizations of appropriations for CMZA grant programs have expired, but Congress has continued to appropriate funds for them over the years. The Coastal Zone Enhancement Grant under Sec. 309 itself was last authorized for appropriations in FY1999.[85] However, during the Trump administration, NOAA requested to eliminate grants under the CZM Program in its budget proposals for FY2018, FY2019, and FY2020.[86] Congress rejected these requests, and ultimately increased the amount appropriated for coastal management grants in the past three years (table 1).[87]

Table 1. Appropriations for NOAA Coastal Management Grants, FY2018-FY2020

Fiscal Year	Appropriations for Coastal Management Grants
2018	$75,098,000 (Actual)
2019	$75,500,000 (Enacted) $75,317,000 (Actual)
2020	$77,000,000 (Enacted) (+$1.5M)

Despite the agency's plans to eliminate funding, this incremental increase illustrates the disagreement between Congress and the White House about whether to prioritize coastal management issues, and environmental issues more broadly. This would suggest there is sufficient bipartisan agreement among lawmakers regarding the value of the CZM Program grants to keep them operational. That said, the Disaster Mitigation and Coastal Resilience Act, which also seeks to reauthorize appropriations for CZMA grants alongside the new grant, is not

[85] CRS, *Coastal Zone Management Act (CZMA): Overview and Issues for Congress,* R45460, January 2019, p.11, 13.
[86] CRS, R45460, p.14; NOAA, *Budget Estimates Fiscal Year 2020,* p.52, 59. https://www.noaa.gov/sites/default/files/atoms/files/NOAA-FY20-Congressional-Justification.pdf.
[87] NOAA, *Budget Estimates Fiscal Year 2020*, p.NOS-61, https://www.commerce.gov/sites/default/files/2019-04/FY2020_NOAA_Congressional-Budget-Justification.pdf; NOAA, *Budget Estimates Fiscal Year 2021*, p.NOS-77 https://www.commerce.gov/sites/default/files/2020-02/fy2021_noaa_congressional_budget_justification.pdf.

guaranteed to pass in a Republican-controlled Senate. If it does manage to reach enactment, the program may not be implemented as intended, even with a history of congressional support and clear demand for funding. For instance, in FY2015, NOAA only had $4.5 million available for its Regional Coastal Resilience grant program (which is implemented under Sec. 310 of the CZMA), but the agency received 132 qualified applications requesting $105 million.[88] The program was funded from FY2015 to FY2017 but was then combined with another resilience-focused grant within NOAA Fisheries in 2017. Thereafter, the agency was involved in a coastal resilience fund with the National Fish and Wildlife Foundation (NFWF) from 2018 to 2019, as opposed to a program separately overseen by NOAA.[89]

Contrary to what is reflected in NOAA's recent budget requests, there is an urgent need and demand for federal support in coastal management and resilience programs. A number of key actors would strongly agree with this. Officials from state CMPs coordinating with the agency have emphasized the critical value of federal assistance for coastal zone management. They have previously expressed concern that the amount available is not enough "to address states' needs in implementing projects."[90] GAO interviewed officials from 25 state CMPs, all of whom shared this sentiment in the face of their respective programmatic needs.[91] As the primary, state government-level implementors of the NCZMP, they are highly likely to welcome funding opportunities through the Disaster Mitigation and Coastal Resilience Grant program. Existing federal programs have a limited ability to support climate migration-related activities. This program expands NOAA's capacity to assist states in this category of resilience efforts, and will enable CMPs to utilize federal funds in ways that were not previously allowable under certain

[88] GAO, *Climate Change: Information on NOAA's Support for States' Marine Coastal Ecosystem Resilience Efforts*, GAO-16-834, September 28, 2016, p.13, https://www.gao.gov/assets/690/680099.pdf; NOAA Coastal Resilience Grants Program, https://www.coast.noaa.gov/resilience-grant/.
[89] NOAA Coastal Resilience Grants Program, https://www.coast.noaa.gov/resilience-grant/.
[90] GAO-16-834, p.13; CRS, R45460, p.14.
[91] GAO-16-834, p.13.

grant requirements (e.g. projects involving low-cost construction or acquisition, which are both unallowable costs for Sec. 309[92]).

Beyond GAO evaluations of the federal government's record on climate resilience, expert communities and advocacy groups will also be paying close attention to U.S. policies and programs. Climate scientists and policy analysts in the non-governmental organization (NGO) space will scrutinize the merits of the proposed grant program. There is strong consensus among nonpartisan NGO constituencies that the current level of investment in resilience and adaptation measures is insufficient. The Union of Concerned Scientists (UCS)—a national nonprofit dedicated "to use rigorous, independent science to solve our planet's most pressing problems"—is one such proponent of ambitious and strategic investment in climate change adaptation.[93] This group of scientists, analysts, and policy experts would view a well-designed grant program as an example of policymakers taking climate change risks and preparedness seriously. In its recommendations for science-based adaptation, UCS underscores the threat that political power poses to equitable adaptation investment decisions. They warn that "public officials tend to focus on the monetary value of [damage inflicted by events such as powerful storms]," which "can lead to damage-mitigating public investments being preferentially allocated to higher-value locations."[94]

The World Resources Institute would agree with the science-based and equitable approach to climate adaptation that UCS advocates. A recent piece on flood data analysis by WRI found that infrastructure investments can significantly lower flood risk to millions of people and

[92] NOAA, Office for Coastal Management, Coastal Zone Management Act (CZMA) Section 309 Program Guidance: 2021 to 2025 Enhancement Cycle, June 2019, https://coast.noaa.gov/data/czm/media/Sect-309_Guidance_2021-2025.pdf.
[93] Union of Concerned Scientists (UCS), "Who We Are," https://www.ucsusa.org/about; UCS, "Toward Climate Resilience: A Framework and Principles for Science-Based Adaptation," June 2016, https://www.ucsusa.org/sites/default/files/attach/2016/06/climate-resilience-framework-and-principles.pdf.
[94] UCS, "Toward Climate Resilience: A Framework and Principles for Science-Based Adaptation," June 2016, p.6, 13.

trillions in dollars of property around the world.[95] In addition, the institute's Climate Resilience Practice published a commentary in 2018 arguing that, in order to equitably and effectively create adaptation solutions and identify priority actions, "it is important to engage affected peoples and communities, resolve potential competing interests between stakeholders, and consider the pros and cons of proposed actions over different time horizons."[96] WRI would praise the proactive investment and locally-driven approach laid out in the Disaster Mitigation and Coastal Resilience Grant program. Positive acknowledgement from organizations such as UCS, WRI, and their like-minded peers would signify that the policy option is both substantive and sound, as these entities are internationally recognized groups working independently of the U.S. government. By extension, their approval would reaffirm that the program is evidence of American leadership on climate policy. Conversely, their harsh critique would indicate that the program is weak, if not reinforcing the lack of a strategic, national approach to investment in climate resilience and adaptation.[97]

Climate change and relevant policies have become increasingly important to the American public as well. In a time when people are witnessing unprecedented natural disasters at home and abroad, voters are prioritizing climate issues in unprecedented numbers as well, according to the Environmental Voter Project.[98] Public polling reveals a significant amount of agreement among Americans regarding their views on climate and energy, as well as the government's role in addressing climate change. Irrespective of the Trump administration's position on climate science and efforts to roll back Obama-era environmental policies, the public

[95] "New Data Shows Millions of People, Trillions in Property at Risk from Flooding – But Infrastructure Investments Now Can Significantly Lower Flood Risk" World Resources Institute, April 23, 2020, https://www.wri.org/news/2020/04/release-new-data-shows-millions-people-trillions-property-risk-flooding-infrastructure.
[96] Christina Chan and Niranjali Manel Amerasinghe, "WRI Commentary: Deploying Adaptation Finance for Maximum Impact," World Resources Institute, October 12, 2018, https://www.wri.org/news/deploying-adaptation-finance-maximum-impact.
[97] GAO-20-127.
[98] Nathaniel Stinnett, "The Climate Voters Are Coming," NPR WBUR, September 25, 2020, https://www.wbur.org/cognoscenti/2020/09/25/climate-change-2020-election-nathaniel-stinnett.

has become more supportive of climate action in recent years. In 2018, a study conducted by Stanford University with ABC News and Resources for the Future (RFF) showed that there is strong public support for climate policy, and "public belief in the existence and threat of global warming has been strikingly consistent over the last 20 years."[99] It is worth noting that the gap in perspective between Republicans and Democrats on the issue is not especially wide:

- Republicans: 57% believed the world's temperature has probably been increasing over the past 100 years. 66% believed that the increase was mostly or partly caused by humans.
- Democrats: 69% believed global warming has probably been happening. Further analysis showed that this was an underestimate—in reality, closer to 89% believed it.

This creates a generally positive outlook in terms of public support for a program that would increase federal climate action through an existing national program like the CZMA. Notably, there is also a strong sense that the government is not doing enough on the issue. About 68% of all respondents said that the U.S. government should do more to deal with global warming. This figure is relatively high, and from 1997 to 2018, it has fluctuated between 56%-70%.[100] These sentiments remain consistent. In a more recent survey that Pew Research Center published in 2019, about 67% of adults said the federal government is doing too little to reduce the effects of climate change. This statistic did not change from the same study conducted in 2018.[101]

There is reason to believe that the public will support the proposed grant program because Americans recognize the interaction of social, economic, and environmental issues when they consider public policy. With regard to adaptation policy specifically, another study

[99] Melissa De Witte, "Public support for climate policy remains strong, according to new poll," *Stanford University News,* July 16, 2018, https://news.stanford.edu/2018/07/16/poll-shows-consensus-climate-policy-remains-strong/.
[100] American Public Opinion on Global Warming, Stanford University Political Psychology Research Group, https://pprggw.wordpress.com/take-action/.
[101] Cary Funk and Meg Hefferon, "U.S. Public Views on Climate and Energy," Pew Research Center, November 25, 2019, https://www.pewresearch.org/science/2019/11/25/u-s-public-views-on-climate-and-energy/.

conducted by Stanford showed that 83% of Americans favor preparation to deal with possible consequences of global warming. In addition, more respondents said they believe that implementing coastal adaptation policies will help the economy (42%) and create more jobs (60%), as shown in figure 6.[102] Furthermore, Americans appear to still care about these issues during a time of crisis. This year, the Yale Program on Climate Change Communication, George Mason University Center for Climate Change Communication, and Climate Nexus jointly conducted a poll that also pointed to strong interest in more government action on climate. Participants were asked whether they support or oppose a number of policies as part of the recovery from the coronavirus pandemic. The majority of respondents (71%) said they support increasing federal funding to protect vulnerable low-income communities and communities of color from environmental dangers like severe flooding and hurricanes (figure 7).[103] This suggests

Figure 6. Percent of Americans Who Think Implementing Coastal Adaptation Policies Will Hurt or Help the Economy and the Job Market.
(Stanford University Political Psychology Research Group, March 2013.)

that the public also considers equity and social justice with respect to climate policy even when it is attached to a larger policy 'package' responding to a global health crisis. These polling insights imply that the views of the public are well-matched with the socioeconomic and cultural considerations that the Disaster Mitigation and Coastal Resilience Grant would take into account.

[102] American Public Opinion on Global Warming, Stanford University Political Psychology Research Group, March 2013, https://pprggw.wordpress.com/prepare-global-warming/.
[103] Oliver Milman, "Guardian/Vice poll finds most US 2020 voters strongly favor climate action," *The Guardian*, September 23, 2020, https://www.theguardian.com/us-news/2020/sep/23/us-voters-climate-change-guardian-vice-poll; "Guardian/VICE Media Poll: Most U.S. voters support climate action and want climate questions during the presidential debates," Climate Nexus, September 23, 2020, https://climatenexus.org/wp-content/uploads/2015/09/Covering-Climate-Now-Climate-Change-Poll-Press-Release.pdf; "National Poll Toplines," Climate Nexus, September 2020, https://climatenexus.org/wp-content/uploads/2015/09/Covering-Climate-Now-Climate-Change-National-Poll.pdf.

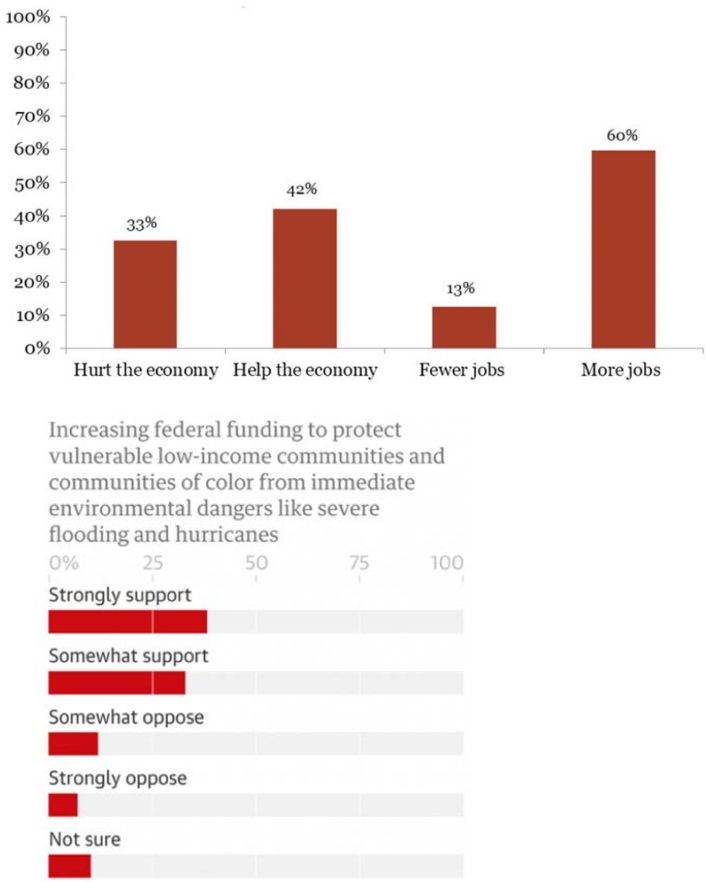

Figure 7. Support for Increasing Federal Funding for Protecting Vulnerable Low-Income Communities and Communities of Color from Immediate Environmental Dangers as Part of the Recovery from the Coronavirus Pandemic. (The Guardian/VICE, September 2020.)

In Rhode Island, coastal hazard management has been an important environmental policy for at least 42 years. You would be well-positioned to champion this new grant program, as the state has participated in the NCZMP since 1978.[104] The CMP is led by the Rhode Island Coastal Resources Management Council (CRMC) and supports the state in dealing with hazards including flooding from SLR and storms, coastal erosion, catastrophic flooding, and damage from hurricanes and other extreme weather events. One of the central objectives of the CMP is to help exposed communities "become more resilient to coastal hazards through proactive planning, science-based regulations and permitting decisions, strong partnerships, innovative tools, and helpful technical assistance." [105]

Relocation is not a new concept to Rhode Islanders who are facing critical coastal risks. In the 2020 evaluation report from the state CMP, it is stated that "homeowners need to identify risks under different storm surge and sea level rise scenarios and consider options for more resilient construction or relocation to reduce risk."[106] Constituents who anticipate this level of risk exposure or are already facing the decision to move will approve of your support for a new CZMA grant that would increase federal assistance for a resilience strategy that did not previously receive much consideration. The Disaster Mitigation and Coastal Resilience Grant program would align well with both the state's environmental hazard management needs, as well as your record on climate issues.

Recommendation

The Disaster Mitigation and Coastal Resilience Grant program would be a valuable addition to NOAA's grant portfolio under the CZMA, and I recommend you proceed with the proposal.

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[104] Coastal Zone Management Programs, NOAA Office for Coastal Management (OCM), https://coast.noaa.gov/czm/mystate/.
[105] NOAA OCM, "Final Evaluation Findings - Rhode Island Coastal Management Program: March 2010 to June 2019," March 2020, p.18, http://www.crmc.ri.gov/aboutcrmc/2020_NOAA312_Findings.pdf.
[106] NOAA OCM, "Final Evaluation Findings - Rhode Island Coastal Management Program: March 2010 to June 2019," p.19.

Dedicating funds to strengthen federal support for climate migration activities through coastal management programs is a prudent course of action. Without increased investment in climate change preparedness, America's citizens, economy, and government will continue to bear the escalating costs of climate change impacts throughout regions exposed to coastal hazards.

It is crucial to acknowledge, however, that the program would not fulfill the outstanding need for Congress to designate a federal agency to lead coordination of climate migration activities. This may be perceived as the proposal's biggest weakness with respect to facilitating relocation operations, including those that may need assistance in the future but are located beyond regions that are eligible to participate in the NCZMP. Clarifying federal leadership for this area of government assistance is important and recommended for the future success of climate migration.[107] The proposed program may instead help advance that clarification process through lessons learned from NOAA's increased assistance for new allowable relocation projects (e.g. infrastructure projects and acquisition) within the bounds of the CZMA.

The Disaster Mitigation and Coastal Resilience Act would create the first federal program explicitly designed to support climate migration as a resilience strategy. The allocation of $100 million annually for the grant will boost NOAA's ability to pursue its coastal zone enhancement objectives, including the prevention or reduction of threats to life and destruction of property.[108] This is an opportune moment for Congress to not only protect vulnerable communities exposed to critical coastal risks, but also shift government focus towards proactive resilience policies and spending at the national level. A key message from the Fourth National Climate Assessment released in 2018 was that "climate change outpaces adaptation planning," accompanied by a warning that failing to adjust to projected climate risk could come with a high cost.[109] It is

[107] GAO-20-488, p.38.
[108] 16 U.S.C. § 1456b. Coastal Zone Enhancement Grants (Section 309).
[109] U.S. Global Change Research Program (USGCRP), *Impacts, Risks, and Adaptation in the United States*: *Fourth National Climate Assessment, Volume II*, [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)], 2018, p.1318, https://nca2018.globalchange.gov/.

necessary to adapt to those risks proactively, as opposed to depending on interpretations of historical impacts to make decisions. GAO's findings support the notion that U.S. investment in resilience measures is incommensurate with the estimated scale of climate risks.[110] As one of the requesters of the July 2020 GAO report that assessed the federal government's limited support for climate migration, you could utilize the Disaster Mitigation and Coastal Resilience Act as a follow-up action.[111]

Per the latest GAO High-Risk List, "the federal government has not made measurable progress to reduce its fiscal exposure to climate change," and it remains an area that requires "significant attention."[112] The proposed grant program can contribute to the prioritization of pre-disaster resilience, a deviation from the historical tendency to focus on post-disaster response. In doing so, the program has strong potential to enhance human security and prosperity, as well as save hundreds of millions of dollars in federal spending. As experts have highlighted, the return on investment for resilience measures is worthwhile because the subsequent benefits significantly outweigh the costs. Based on analyses of federal mitigation grants, NIBS reports show that the benefit-cost ratio associated with hazard mitigation has increased from 4:1 to 6:1 over the past 15 years—and the total benefits from $27.4 billion in grants awarded over 23 years led to $157.9 billion in benefits.[113] Increasing spending on hazard mitigation is essential to keep pace with climate change impacts and reduce future damages and costs. Furthermore, the majority of Americans support government action on climate change, and they simultaneously care about the socioeconomic and cultural nuances of interrelated policies.[114]

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[110] GAO-20-127; GAO-20-488, p.5.
[111] GAO-20-488.
[112] GAO 697345, p.49, 110.
[113] Martinez-Diaz, "Investing in Resilience Today to Prepare for Tomorrow's Climate Change," *Bulletin of the Atomic Scientists,* vol. 74, no. 2 (2018), p.66-67; NIBS, *Natural Hazard Mitigation Saves: 2019 Report.*
[114] Funk and Hefferon, "U.S. Public Views on Climate and Energy," Pew Research Center, November 25, 2019; "Guardian/VICE Media Poll: Most U.S. voters support climate action and want climate questions during the presidential debates," Climate Nexus, September 23, 2020; "National Poll Toplines," Climate Nexus, September 2020.

Ilan Kelman, Professor of Disasters and Health at the University College of London, asks in his book, *Disaster by Choice,* "Why do we not continually use the knowledge we have to avert disasters?"[115] With what expert communities and policymakers have learned about known and anticipated climate change impacts the nation will face, pre-disaster investment in coastal resilience is imperative. If the government conducts 'business as usual' in terms of climate risk management, the federal fiscal exposure from climate risks is certain to increase. Vulnerable groups will not have enough resources to handle these risks on their own, and the federal government will be called upon to assist in locations where community and state-level efforts are inadequate to manage the urgency and danger of coastal hazards.

Taking these factors into account, you have meaningful and science-based justifications to put forward this policy option. At its core, the Disaster Mitigation and Coastal Resilience Act presents a chance to invest in a community-driven movement towards a more climate-resilient, productive, and secure future for Americans. If the legislation ultimately does not pass, your support for the proposed grant program would nevertheless signal to constituents, environmental experts, your peers, and other stakeholders that you are serious about prioritizing environmental hazards and climate change preparedness. The proposal itself will showcase the extent of your concern regarding the existential threat that vulnerable coastal communities face as their environments are rendered uninhabitable by SLR, flooding, and erosion exacerbated by climate change. It will make evident your commitment to national readiness for the variability of nature and risk management—a task that requires continuous and collective vigilance.

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[115] Ilan Kelman, *Disaster by Choice: How our actions turn natural disasters into catastrophes*, Oxford University Press, 2020, p.43; "Author Information - Disaster by Choice," Oxford University Press, https://global.oup.com/academic/product/disaster-by-choice-9780198841340?cc=us&lang=en&#. Dr. Kelman is a professor at the University College of London's (UCL) Institute for Risk and Disaster Reduction and Institute for Global Health, and his research focuses on linking disasters and health, including the integration of climate change into disaster research and health research.

Curriculum Vitae

Eda Lee was born and raised in New York. She currently works at the World Resources Institute as Executive Assistant to the President and CEO. Prior to arriving at WRI, she supported the Chief of Staff and Executive Director of Family Planning 2020 at the UN Foundation. Eda holds a Bachelor of Arts in International Relations-Political Science from Wellesley College. Her academic interests include environmental security, gender equality, and international affairs.